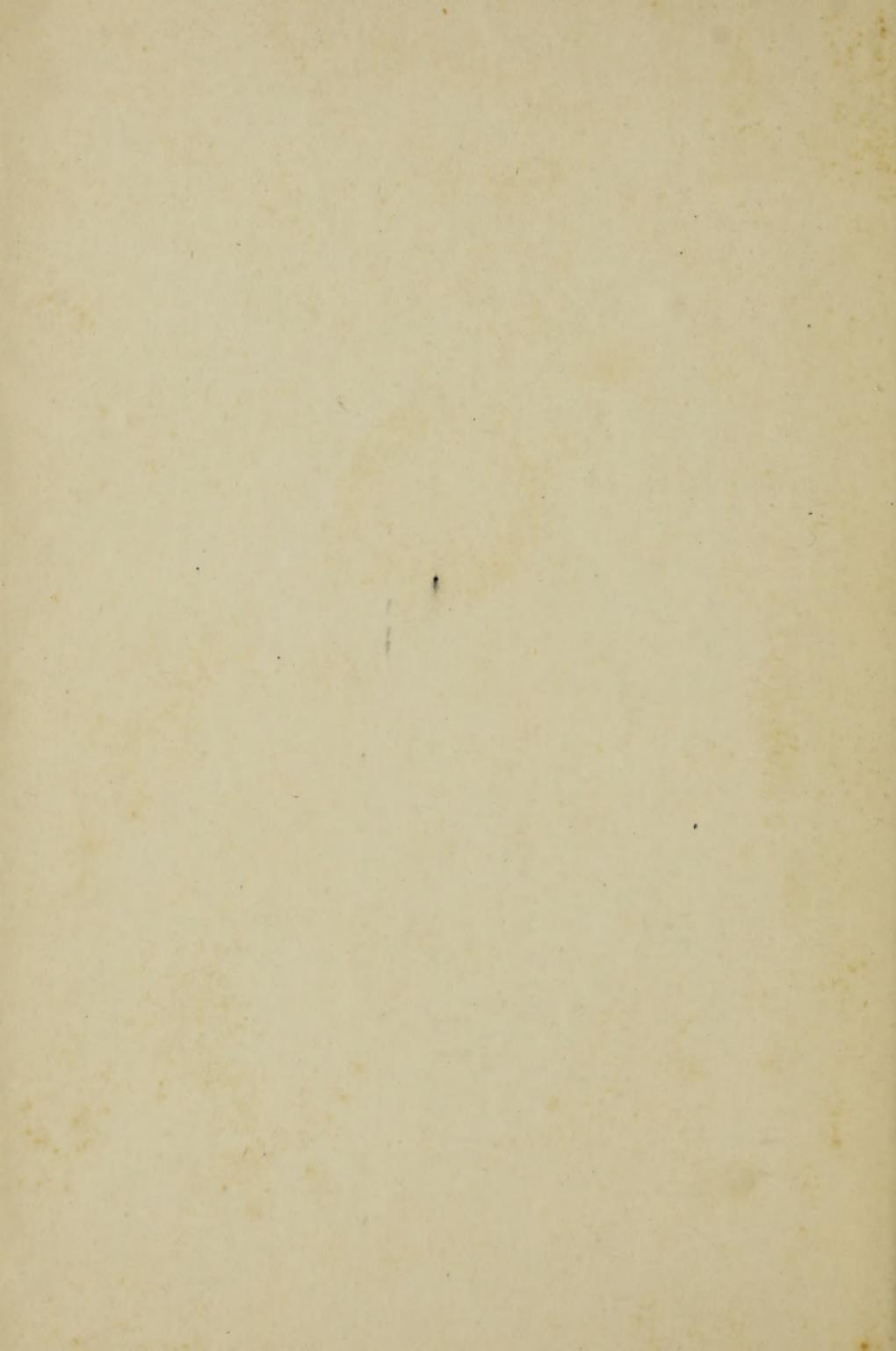


COLLODIO-
ETCHING.

HARTLEY

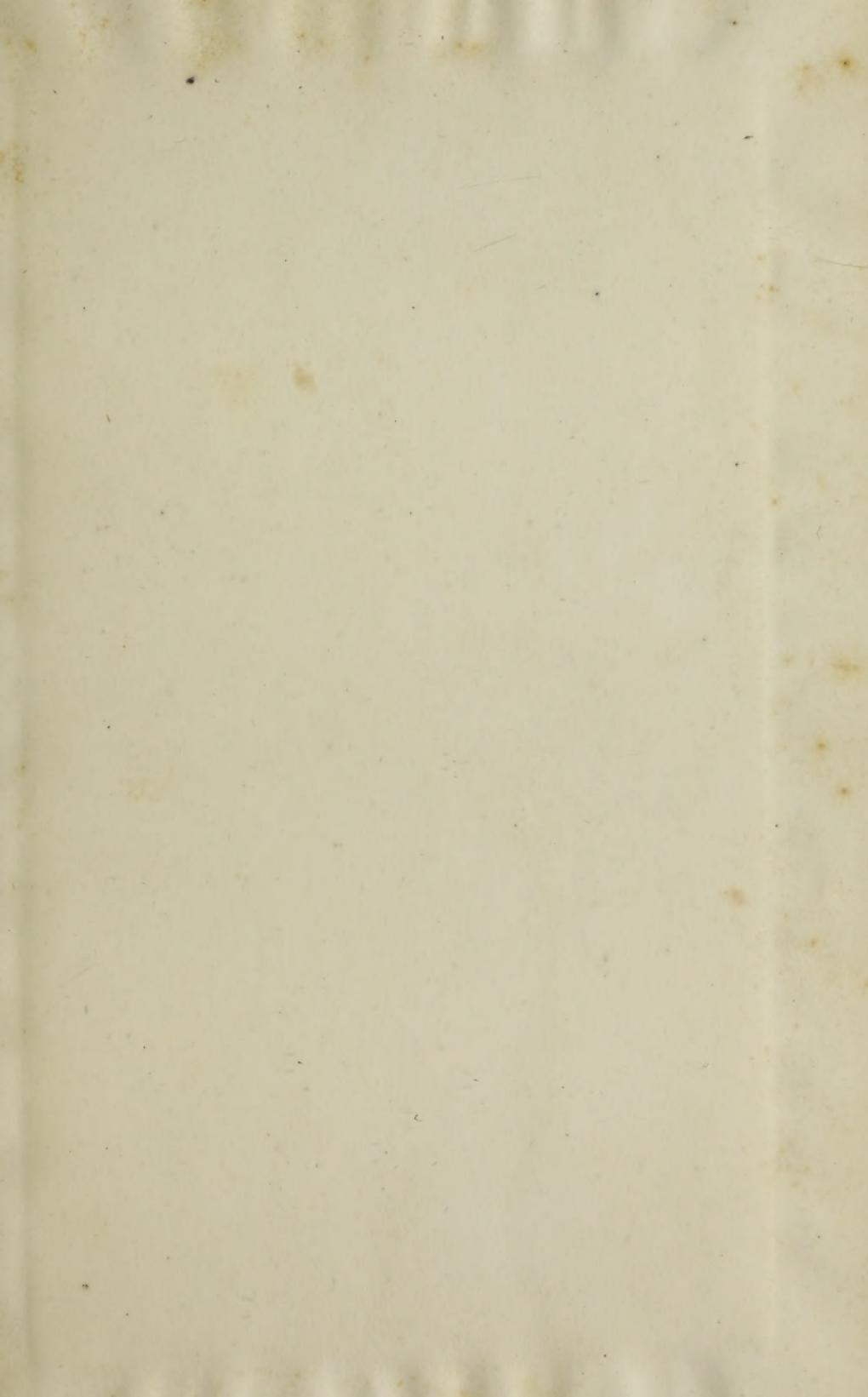


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ON THE DELAWARE RIVER, PENNSYLVANIA.

A GUIDE

TO

COLLODIO-ETCHING.

BY

BENJAMIN HARTLEY.

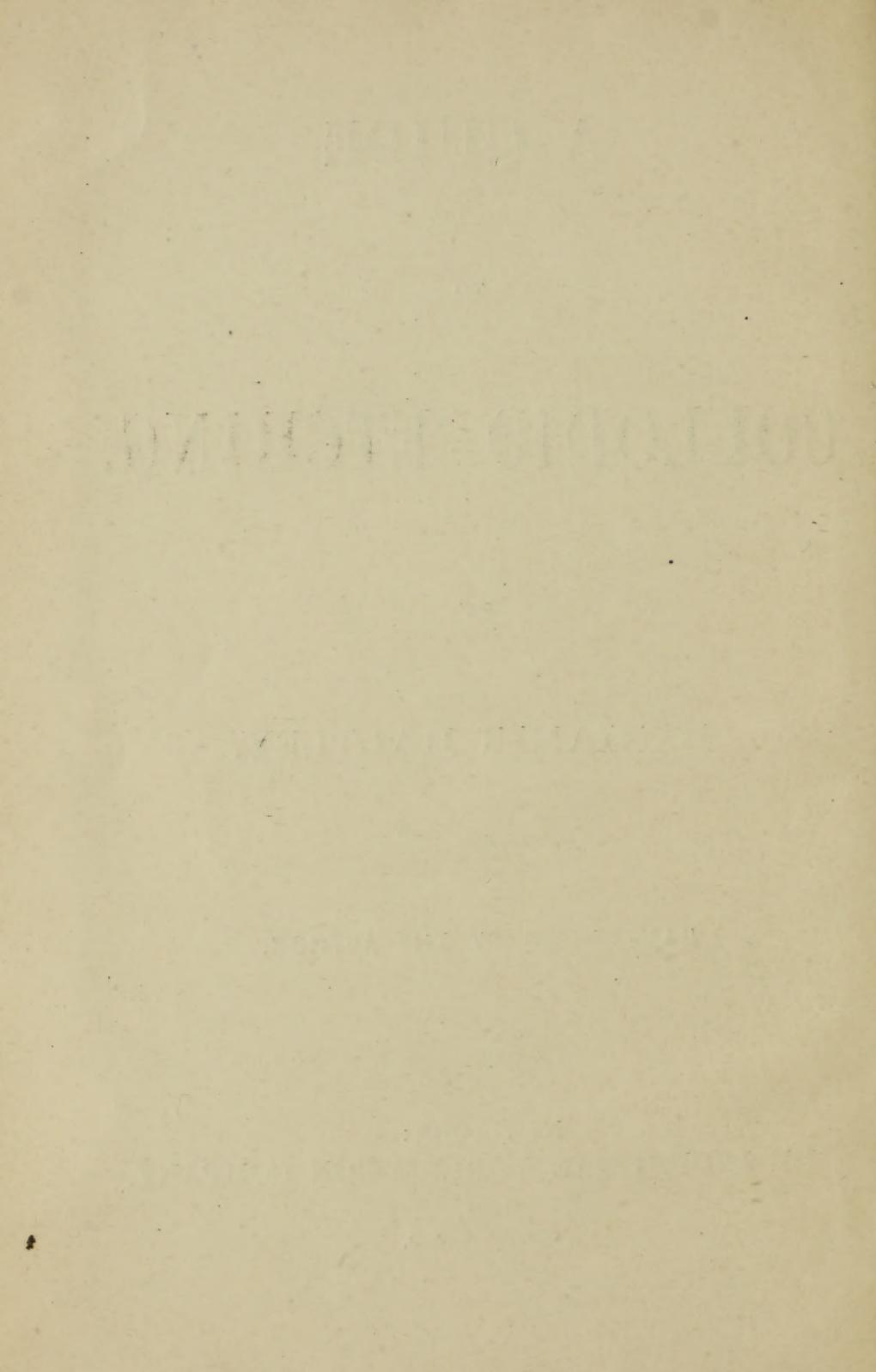
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INTRODUCTION.

For many years a want has been felt, especially among amateurs, for some simple and inexpensive method of duplicating their sketches and studies for the benefit of their friends. Bringing home pictures from a summer's vacation trip, or from a foreign land, many have desired to share their pleasure with others, and yet could not give away their original drawings. Thus they have had recourse to various means for the copying of their productions. Some have tried lithography, making the drawings, and getting a lithographic printer to do the presswork; others have tried copper-plate etching, and of course, have had to call in the printer's aid, until, a short time ago, Mr. Hammerton invented a small press for home use. Some have had their pictures photographed, while others, of late years, have made pen and ink drawings, and had them photo-engraved and printed on a common letter press. Many more have adopted the portable camera outfit and given up sketching altogether.

Nearly all these methods have been tried by the writer and found inconvenient, expensive, and troublesome.

It was suggested, some years ago, that the glass plate, as prepared by the photographer for the camera, might

be drawn upon with a needle, and then printed like an ordinary photograph. A volume of such drawings, by some of our best artists, was published, and the method was discontinued.

It is for the purpose of reviving this interesting process that this hand-book is given to the public, in the hope that many will be enabled by it to duplicate their studies for the pleasure and benefit of others.

It is the design of the present work to give all the practical information necessary on the subject, so that those who know nothing about photography will be able to carry into effect all the details of this system.

Of course it is understood that with this method the young student should combine the study of perspective, and sketching from nature, in order to obtain the best results, but even by those who have no knowledge of drawing, very satisfactory sketches may be made by following the directions given in Part V.

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COLLODIO-ETCHING.

PART I.

ON THE MATERIALS.

As nearly every art can be practiced with few or many materials, we will devote this chapter to the consideration of those used in collodio etching, in two parts; first, *materials absolutely necessary*, and second, *those various tools and appliances which assist and make more enjoyable the practice*. The price of each article can scarcely be indicated, but an approximate idea of the expense connected with the art can be given. By putting the lists in tabulated form, the reader can see at a glance the various articles required for each stage of the process, viz.: Preparing the plate, etching the negative, and printing the picture.

<i>Necessary.</i>	<i>Convenient.</i>
Glass Plates.	Bath Holder and Dipper.
Alcohol.	Collodion Vial.
Camel-hair Brush, broad.	Vise for Plates.
Collodion.	Graduate.
Nitrate of Silver.	Scales.
Porcelain or Glass Tray.	Hydrometer.
Proto Sulphate of Iron.	Silver Bath, \$2 per pint.
Acetic Acid, No. 8.	
Glass Funnels.	
Filter Paper and Blotting Paper.	
Soft Pencil.	Retouching Frame.
Stumps.	Negative Box.
Magnifying Glass.	
Needles.	
Transfer Paper.	
Camel-hair Pencil.	
Negative Varnish.	
Stand or Frame.	
Shellac Varnish.	
Plain Paper.	Printing Frames.
Nitrate of Silver.	Mounts and Mats.
Chloride of Gold.	
Chlo. of Ammonium.	
Dishes, Flat.	
Acetate of Soda.	
Hypsulphite of Soda.	
Printing Board.	
Wooden Pails.	

Taking the column of *necessary* articles, we find that those specified in the first section can be procured for four dollars and fifty cents, those in the second section

for one dollar and fifty cents, and those in the third section for two dollars and fifty cents, making the entire cost amount to eight dollars and fifty cents. The articles mentioned in the other column can be added at any future time for convenience.

About the chemicals we need not say anything, except that the *best* are always the cheapest. We would state that the porcelain trays are to be preferred to any earthenware dishes you can procure, although flat stone-china platters will answer, if you can find them without a bulge in the middle of the bottom. They are very difficult to pour out of, however, and we would recommend the regular photographer's dishes, if you get only two instead of four. The one used for coating the plate with silver can also be made available for sensitizing the paper; and the one for toning the prints can also be used for the salting. Any earthenware dish will do for fixing, but must not be used for any other part of the process. The thing to be kept in mind from beginning to end is *to thoroughly cleanse all dishes after being used.*

The needles, three in number, and of different sizes, have to be set in handles. Those used for camel-hair brushes are better than anything else for the purpose. You must run a slight groove on one side for the needle, and tie it firmly, leaving only a quarter of an inch projecting from the end of the holder. The largest needle

you must file away at the point obliquely until it presents, under your magnifying glass, a long lozenge shape. With such you can cut or scratch out the broad lines without making the film ragged, as is frequently the case with the common point. Keep your needles sharp.

The "printing board," indicated in the list of necessary articles, is a simp'e, home-made affair, while the "frame," in the second list, is the regular printing frame of the photographers. Both will be found described and figured in the chapter on printing. The other articles will also be explained in the various parts of this work.

By the above arrangement of materials the reader can decide at once which portion of the process he will undertake first, and purchase his utensils accordingly. The upper group contains the articles belonging to the *preparing* of the plate; the middle group, those used in *producing the picture* on the plate, and the third group, the chemicals and apparatus necessary for *printing* the pictures.

Now you can dispense with the preparation of the plates and buy them ready to your hand from any photographer for ten cents each and upwards, while you can give your exclusive attention to making the negative and printing it. Or, you can prepare the plate and draw the picture, and get a photographer to print it.

Or, again, you can confine your operations simply to drawing the pictures, getting the plates prepared, and afterwards printed by a photographic artist. In this latter case the implements are few and by no means costly, so that perhaps it is best to begin with making the negatives, which is the only artistic part of the whole system ; adding afterwards the various requisites for the other portions of the process. We will, in this Manual, however, give instructions for all parts of the work, beginning with the cleaning of the plates.

PART II.

THE PLATE AND ITS PREPARATION.

The glass plates used in this process must have the same qualities as those used in photography. The conditions for their employment are :

1. *Transparency*.—This must be as nearly perfect as possible, so as to permit the light to pass through unchecked in the printing of the picture. The white is always to be preferred to the green glass, and bubbles are always to be avoided.

2. *Evenness of Surface*.—Those plates which are not smooth and even will not make perfect contact with the paper in the printing frame, and are very apt to break.

3. *Cleanliness of Surface*.—There is some glass which it seems impossible to get clean; there is an oiliness and cloudiness about it which will not yield even to nitric acid.

For small pictures, the ordinary glass is good enough if flat and clean. There are regular sizes sold by dealers in photographic goods, and the glass is generally selected with some care.

1.—THE CLEANING.

The greatest cleanliness in the treatment of the plates is a condition of primary importance. Some operators use nitric acid, others employ potash and sulphuric acid. Some recommend cyanide of potassium, but for our purpose, with care in the selection, good glass can be cleaned very nicely with soap and water, and then polished with alcohol and a piece of canton flannel, and a little rotten-stone.

Be sure and clean the edges of the plate as well as the front and back, for if you do not you will soon find a dirty bath that will give you much trouble.

In the list of articles *convenient*, there is mention made of a *plate vise*. There are several patterns, the simplest and cheapest being the wood screw vise, as seen in Fig. 1. If you do not wish a vise, you can screw a small strip of wood to a table, and while you hold the plate firmly against it with one hand, you can clean it with the other. In this case, put a piece of blotting paper under the glass. In order to know when it is clean, you must breathe upon it, and if the breath on the plate does not look even, then the spots must be rubbed over again until the whole of the surface takes the breath equally, showing a bluish color. *Remember*, dirty fingers and dirty rags or towels can never make clean plates. Both

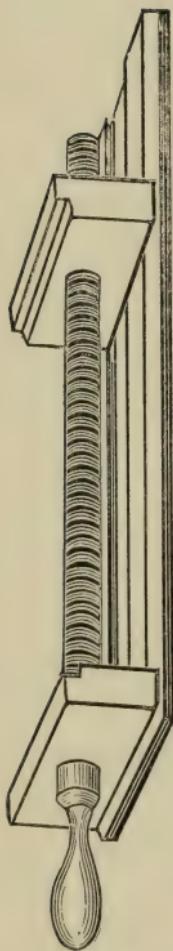


Fig. 1.

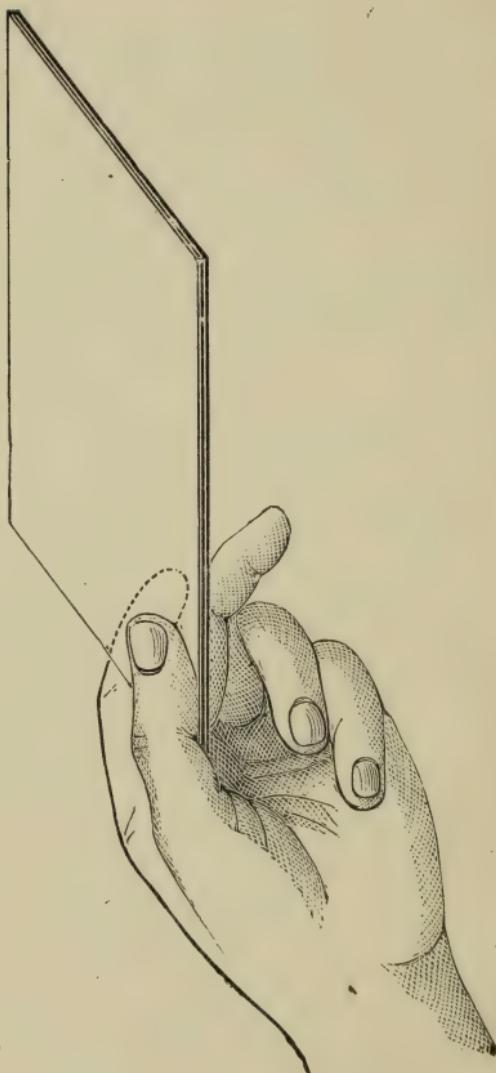


Fig. 2.

sides must be clean, but only the one on which the collodion is going to be poured need be polished with much care. Be careful not to scratch the plate if you are going to do simple outline work.

When the plate is thus cleaned you will find it attracting the dust by its becoming somewhat electrical ; you will then have to use the duster (a camel-hair brush of the large, flat kind). Do not keep the duster lying on the table, but hang it up and it will always be clean and ready for use.

2.—THE COLLODIONIZING.

This operation, like nearly every other, requires some practice in order to be done evenly. The glass plate, Fig. 2, should be held perfectly horizontal by one corner (*a*), a pool of collodion is then to be poured on the centre of the plate ; when a sufficient quantity has been poured on, the plate is gently inclined so that the collodion may flow first to corner, *a*, next to *b*, then to *c*, and finally to *d*. Holding the collodion bottle or vial under corner, *d*, you receive the excess of fluid ; then gently, and with a rocking motion, turn the plate to a vertical position. Keep up the motion until the collodion has, in a large measure, drained off ; then, resting the corner on a piece of blotting paper, close the collodion bottle, so as to stop evaporation.

3.—THE SENSITIZING.

Before coating the plate with collodion, you must see that your silver bath is ready and in good condition, for the plate must be put in immediately after the collodion has set and become sufficiently dry. This is told by touching the film with the finger at the corner, *d*, and if the collodion will tear then it is in the proper condition to be put into the bath.

The silver bath can be made by simply dissolving the crystallized nitrate of silver in distilled water, or filtered rain water, in the proportion of 35 grains of silver to the ounce of water. This you filter through the filter paper, into the bath-holder, and iodize it by leaving a coated plate in it for an hour or two. Removing this plate gently, the bath is ready for use.

The operation of sensitizing is done in a dark room, so that no actinic rays can strike the plate. Yellow light can be admitted, because it is non-actinic; still, it is advisable not to have too much of that. It is convenient to use an oil lamp in a dark closet.

There are porcelain, india-rubber, and glass bath-holders, but the latter are to be preferred. There are also boxes made to support these holders, which are very convenient. Fig. 3 shows the glass bath holder and dipper in it. Fig. 4 is the same in box and placed ready for use.

When the plate is in the proper state of dryness, it is placed upon the ledge or hook of the dipper, and lowered into the bath with a rapid, steady, and continuous motion, otherwise lines will be produced on the film. You must be sure to have a sufficient quantity of bath to

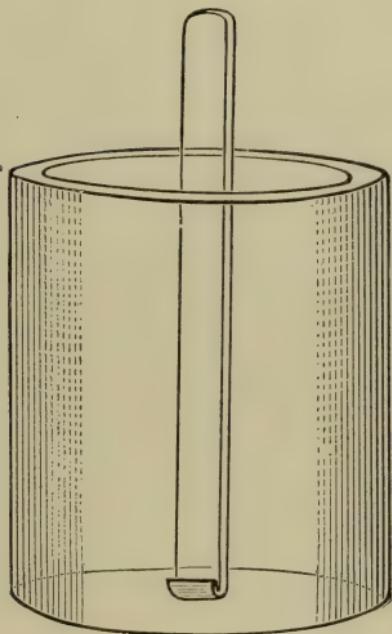


Fig. 3.

cover the plate entirely. The glass dippers, of course, are easily broken, so the best are those made of silver wire.

Sensitizing in a dish or tray (Fig. 5) has one great advantage, namely, a much smaller quantity of silver solu-

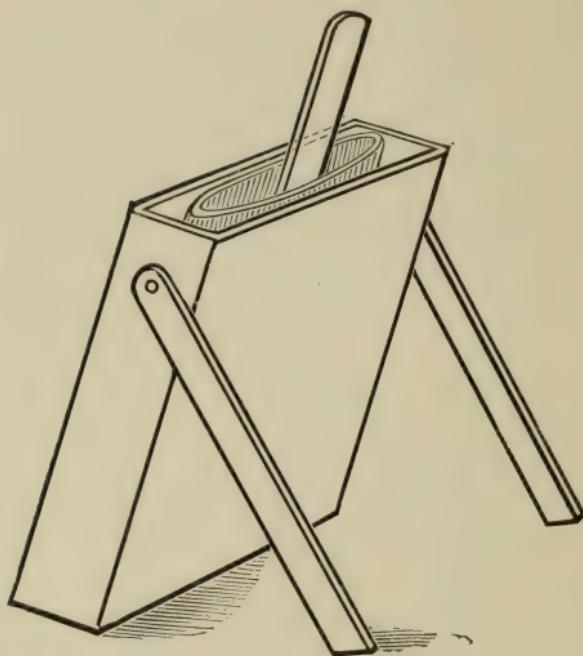


Fig. 4.

tion will answer the purpose. A dish is also much cheaper than a bath-holder. The dishes are made of the same materials as the holders. The bath solution is

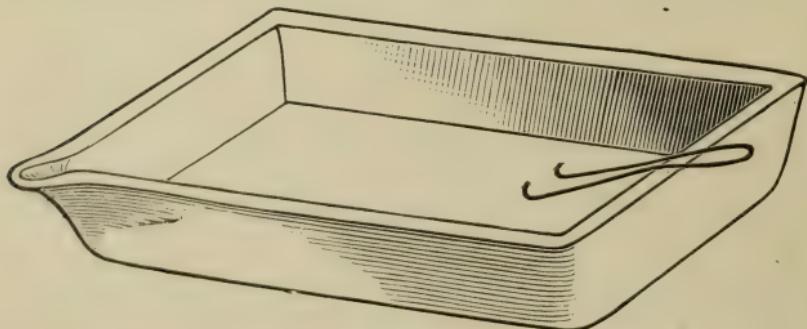


Fig. 5.

filtered into the dish until it covers the bottom about one quarter of an inch ; the scum is removed by drawing strips of writing paper over the surface until they appear free from dirt ; the coated plate is then placed vertically in the dish ; the back of the plate touching the side or end of the dish. It is then lowered with a very steady, regular motion, until it becomes entirely submerged, the coated side being downward and held from contact with the bottom by means of the silver wire hook.

After the plate has been in the bath for three or four minutes, it must be raised and examined ; if it looks bluish and covered with oily-looking streaks or specks, it is to be lowered again until it presents a yellowish, white, creamy appearance. Then the plate is to be seized by the corner and held above the bath to allow the silver solution to be drained off thoroughly. Now, if you have a camera and plate-holder, you can expose the plate to a dead-white screen. But we are supposing that you have no camera. In such case, holding the plate by the corner, as before described, you open the door of your dark room and let a stream of white light fall upon the plate for a couple of seconds, then closing the door again, you proceed to intensify the coating of silver by means of a solution of sulphate of iron.

4.—THE STRENGTHENING.

We use the term *strengthening* for the same portion of the process that photographers call *developing*, because in this system there is no image on the plate to be brought out or developed. For the strengthening solution take 3 parts of sulphate of iron, 3 parts of acetic acid, 1 part alcohol, 100 parts water. These you thoroughly mix and filter. Then taking a small quantity in a wide-mouthed bottle, you pour it on and off rapidly, covering the plate every time, until the film becomes quite opaque. This must be done much more rapidly than the coating with collodion, and begin at the corner instead of pouring in the centre. The flow must not stop for an instant. If the iron is kept on too long it will begin to eat off the silver and weaken the film. The proper amount of strengthening can only be told by practice. The action of the iron must be stopped by pouring on water as soon as the film has reached the full intensity of opaqueness. Wash both back and face of the plate ; in rubbing the back be careful not to touch the film on the front. After this you put the plate in the rack, or lean it against the wall to drain and dry ; or you can hold it over a lamp or fire to dry it quickly. In using a lamp, it is necessary to keep moving the plate so as to heat it equally, or else it will break. When *quite* dry it is ready for the picture.

PART III.

MAKING THE NEGATIVE.—1. TRANSFERRING THE PICTURE.

It will be well, in beginning the practice, to varnish one or two plates on which to experiment. The varnish must be thin and the plate warmed to blood heat. You can then pour on the varnish just as you did the collodion, and let it drain off into the bottle. It will soon become dry and hard.

Now you can take your sketch, which must be a little less than the plate, say a quarter of an inch all round, and drawn with a soft pencil, and turn it over on to the varnish; then rub the back with your finger, being sure not to let the drawing slip from its place. When you lift the paper and raise the plate a little, you will see the sketch transferred.

Should you wish to copy a large picture, you must make a small outline of it the proper size for your plate, and then follow the above instructions.

Of course the reader knows that, in order to have a true print, the picture must be reversed on the plate, and it will be seen from the above remarks that when the

plate is varnished first it is a simple matter ; but when you wish to do fine work the sketch has to be drawn directly on the unvarnished film, which is a very delicate task. You may succeed in drawing finer lines with the needle on a *very thinly* varnished surface ; the only trouble is that frequently you have to go over a line two or three times before you get it through the film, and then find that it is thicker than you wished.

Do not think to save time and trouble by reversing the picture as you draw it. That is very hazardous. First, make a reversed outline. This, again, is very simple, provided your picture is just the right size, for then you can place a piece of transfer or carbon paper on your table or drawing-board ; put on this a piece of drawing paper, and on that lay your picture and go over the complete outline with a very hard pencil or ivory point, when you will find, on lifting the paper, a perfect reversal of your subject. This you can copy on the plate.

The film being very delicate and tender, great care must be taken. A pencil, no matter how soft, is very apt to catch on some particle of grit and make a line through the film, instead of simply a tracing on the surface. This "blocking in" of the subject you will find more easily done with a small, sharp-pointed stump or blender. One made of wash leather is to be preferred to

a paper one, provided it has a good point. With this you can sketch on the film, and, if used gently, the false strokes will not show in the print, because you remove no more of the film than the varnish will absorb when the picture is finished. Make only the outline in this way, and when that is done you are ready to take the needle.

2.—DRAWING WITH THE NEEDLE.

The Easel. For the purpose of drawing, and in order to see the design as it progresses, you require to support your plate in a slanting position, so that the light can be thrown up from some reflecting object underneath. A photographer's retouching frame is the most convenient,

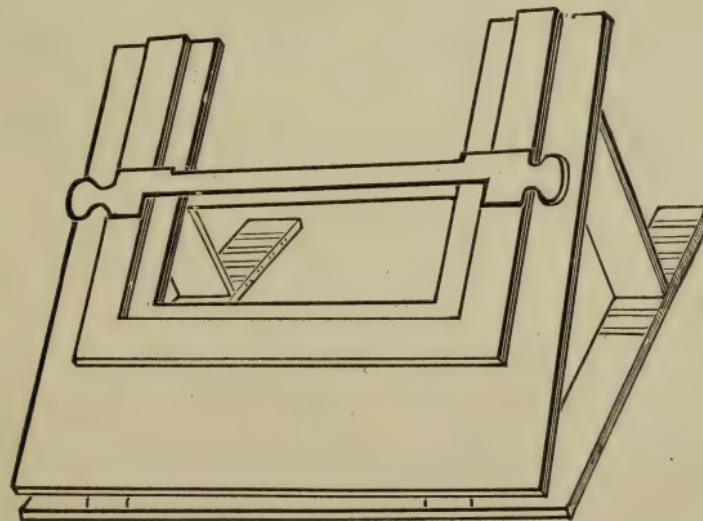


Fig. 6.

but rather expensive. Fig. 6 shows a very nice easel, which can be made for half the money that the regular frame would cost ; while Fig. 7 exhibits a still simpler form, which can be constructed by means of any old slate frame. The only thing not shown in the drawing, is the

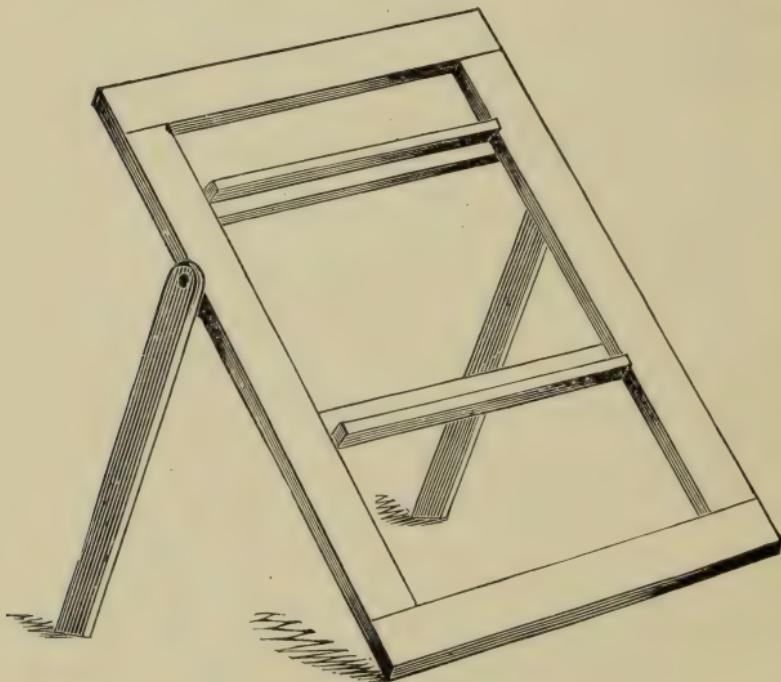


Fig. 7.

manner of holding the cross pieces in position. That is done by screw-eyes, which pass through the small slats into the back of the frame.

THE MAGNIFYING GLASS.

The next thing to be considered is the glass for showing the fine lines of the work. This is an indispensable requisite, as nothing but the coarsest work can be done without it. There is a very convenient stand made for the eye-glass, which can be taken apart and packed in small compass. It is sold by dealers in engravers' tools for \$2.00. There is an objection, however, to using a single eye-glass, although so common with our engravers, and that is the strain on the nerves of the eye that is used. It can be obviated in part by changing the eyes in working. But it is best to have either a *large* glass that you can look through with both eyes at once, or *two* magnifying glasses fitted in a frame, and supported by the stand. Do not have them like spectacles to put on, for in such case you cannot as readily lift your eyes from your work to rest them.

NEEDLES.

The tools used in this process are common sewing needles put in handles. One very fine, one very coarse, and a medium one. In addition to what has been said in the chapter on the materials, it may be remarked that the finest needle ought only to project from the handle

one-eighth of an inch, because the point is easily bent and then difficult to work with.

Having placed the prepared plate on the easel, and arranged the reflector, which may simply be a piece of white paper laid flat on the table behind the stand, you adjust your magnifying glass, and with the finest point trace the complete outline of the subject which you sketched with the pencil or stump. Then, beginning with the distance, you fill in the shadows with very fine lines, not too close together. We will suppose the reader is copying Plate II, or drawing a subject similar to it. The tree with the fish-hawk's nest in this illustration had better be left as sketched with the stump until the last, as it would be difficult even to outline it without injuring the lower part of the plate. The distant trees are in simple outline, with a little shading put on over the trunks and stems, and made darker near the ground. The meadow land can be indicated by a few strokes, while the river can either be left opaque or lined very finely, as here shown. All this, together with the boats, is done with the finest needle. The trees, ground, and fence can be put in with a little more strength and detail, using the medium-sized needle; also the foreground grasses and weeds can be done with the same point. When this is accomplished, take a little negative varnish and add an equal quantity of alcohol; shake it

well, and pour it over the plate, as described further on. (This is if you are working on an unvarnished surface.) When this is dry, you can draw the tree boldly with the large needle, being careful to leave the white lines well defined, also adding a few strong touches, to give more character to the foreground.

PLATE III.—IN THE CATSKILLS.

We present another illustration, in order to call the attention of the student to several details not treated of in the preceding example, as well as to give some general hints on each part of the picture. In this view we have everything that goes to make up a landscape. Mountains, trees, rocks, and water.

Look at the last mentioned element, which is in most pictures of the first importance, water. Being in this sketch almost as still as in a pond, the reflections are strong and clear, and the nearer to the sunset the stronger they appear. Under such conditions the lines must be kept very straight, both horizontally and perpendicularly, in order to give the effect of flatness and transparency. To represent the current of a stream, lines are used which are sometimes curved, but more frequently straight, although not horizontal, as they all run towards some perspective distance or vanishing

point. In broken water, such as rapids, cascades, etc., the lines must follow the direction of the flow.

In regard to trees, it may be stated that each artist has his own manner of representing them. Trees in the distance are nicely represented by a series of small curved lines, forming the outline of each group. Foliage near the foreground is best treated by the angular or zig-zag line, or by very short shade lines combined with the curved. Foreground trunks must be marked with their peculiar characteristics so as to be recognized, as the smooth beech, the rough oak, etc.

In treating rocks, you will find that the rough texture is obtained best by short, sharp cross-lines.

We must not omit speaking about the sky, which is always a puzzle to beginners, and causes perhaps more discouragement than any other part of the picture. It is best to leave it blank until you have gained considerable delicacy as well as freedom of touch. The sky is sometimes the most important part of the whole picture, and so must be studied carefully. It is not advisable to represent a clear sky as engravers do, by fine lining, heavy at the top, and becoming lighter and wider apart as they approach the horizon. In cloudy skies the top is frequently the lighter part, and near the horizon the darkest. You must always remember that no portion of sky or cloud must be as dark as the shadows on the

ground. The drawing finished, the next operation is the varnishing, unless that has been done before.

4.—VARNISHING.

Any good negative varnish will do for this purpose, but I will add a formula for those who wish to make their own: Balsam fir, $\frac{3}{4}$ oz.; oil of lavender, 3 oz.; gum sandarac, $7\frac{1}{2}$ oz.; alcohol, 48 oz. If you wish it very thin, add more alcohol. Warming the plate to blood heat, you hold it by the corner, as for coating with collodion, and pour on the varnish so as to cover it, and then drain back into the bottle as previously stated.

5.—STOPPING OUT.

If, now, you were to print from the negative just made, you would find that all the lines in the picture would be of the same strength of color; those representing the distance would be just as brown or black as those in the foreground, only they would be fine, more delicate, and further apart.

Now we not only desire *fine* lines, but *light* lines. In the several bitings of a copper plate there are, of course, differences of intensity in the printing, and the blackest lines are made so by having more ink heaped upon them, while in the photo printing the degrees of power are rendered by the difference of tone. This difference

is produced by the sky and distance being painted over with a colored varnish prepared for the purpose.

By taking a little of the negative varnish and evaporating a great deal of the alcohol, then adding a quantity of pulverized gamboge, you can make the necessary article. Shellac varnish is better than the other. The color will sink as a sediment, and will require to be shaken up a number of times. A very good way is to pour out a little before you shake it, to use on the parts you wish to throw back but little, then with the thicker varnish you go over the sky and distance, and any points of high light in the foreground. This you can do with a camel-hair brush. The only difficulty is in the varnish drying so rapidly that you have very little time to consider. Your mind must be made up beforehand. Unless it is done quickly there will be lines and ridges that will mar the print. If, when you put a little varnish on the negative, it spreads, and the color runs to the edges, leaving a transparent place in the centre, it shows that there is too much alcohol, and you must let the bottle stand open for a day or two. Perhaps you will have to go over the sky or the distance two or even three times to get it into its proper position. When all this is accomplished your negative is finished and ready to be printed.

PART IV.

PRINTING THE PICTURE.—1. THE PAPER.

The first thing to be considered in this part is the *paper*. At the present day there is no use of thinking about preparing one's own paper; it can be bought much cheaper and better than it can be made at home. There are the two kinds; *plain* and *albumenized*. There is comparatively little use made of the plain paper nowadays for the ordinary photographs, but it is much better for *our* purpose than the other. It is not glazed, and so, when printed on, the picture looks, much more like an etching or an engraving, being flat or dead in color. If, however, any one prefers the appearance of the regular photographic print, the albumenized paper can be treated in exactly the same way as the plain, only with stronger solutions.

There are many works published on the subject of photographic manipulation, and if the reader desires a very excellent and thorough treatise on the process of printing, he cannot do better than obtain a copy of the "Practical Printer," by C. W. Hearn. Of course it contains a great deal more than we require to know.

For this hand-book I take the liberty of culling from

various sources, European as well as American, ideas, which, I think, will assist in giving the reader a good foundation on which to build as high and as great as he pleases.

Of plain papers, Anthonyms' Tapioca and Clemon's Arrowroot are excellent.

2.—SALTING THE PAPER.

Getting paper unsalted, or wishing to re-salt what is on hand, you proceed in the following manner: In a large wide-mouthed bottle put 30 ounces of pure rain water, and to this add 180 grains of the chloride of ammonium. Shake well, and when the chloride is dissolved, which can be hastened by warm water, filter it into a clean porcelain dish. If any bubbles form on the surface, break them with the glass rod you use for stirring the solutions. The paper can now either be floated on the top of the liquid, or be drawn through it. If floated, you must look sharp to find the side of the paper that has the finest grain, then taking hold of the paper by the opposite diagonal corners, you lay it on the solution as described for silvering further on. (See Fig. 9.) Float 10 seconds. The mode of salting which is preferred, however, is to draw the paper *through* the solution, which is done in this way, Fig. 8. Place the dish where you can have plenty of room. Take the paper by the

two opposite corners, let it fall behind the further side of the dish, then dipping the nearest side into the liquid, slowly and steadily, without pausing, draw the whole paper through, taking care that every part of the sheet

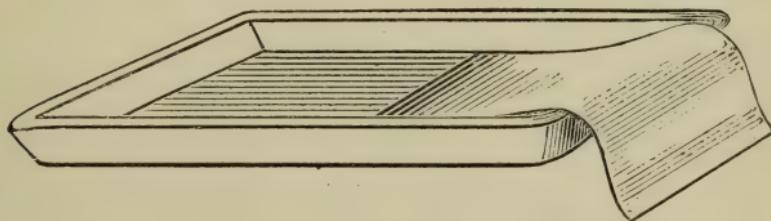


Fig. 8.

is wet; then raising it, allow the liquid to drain into the dish. The principal thing to be thought of is to have enough solution to get the paper under it at first. Hang the paper up to dry in a place free from dust. The solution can be used repeatedly, so pour it back into the bottle and filter it when required. *Clean the dish thoroughly*, and put it bottom side up.

3.—SILVERING THE PAPER.

For this purpose you make a bath as follows: Nitrate of silver, 240 grs.; pure rain water, 8 oz. This, as you see, makes the bath 30 grains of silver to the ounce of water. Now there are two ways of silvering or sensitizing the paper; one is by *floating*, as in the case of salting, and the other is by *swabbing*; that is, spreading the solution over the paper with a piece of canton flannel,

the sheet being tacked to a flat board. The floating, however, is by far the better method. This operation need not be performed in a dark room ; still the light should not be very strong.

Having filtered the silver solution into the tray (and you must filter it every time you use it), you fold down a small corner of the paper, then taking hold of the sheet by the two diagonal corners, and letting it curve down in the centre, you place it in that way on the bath, the *finest-grained* side to the silver, and gradually lower the corners that you have hold of until the paper lies flat. If it curls up, just breathe on it and it will go down immediately. The position of the paper as it comes in contact with the solution is shown in Fig. 9.

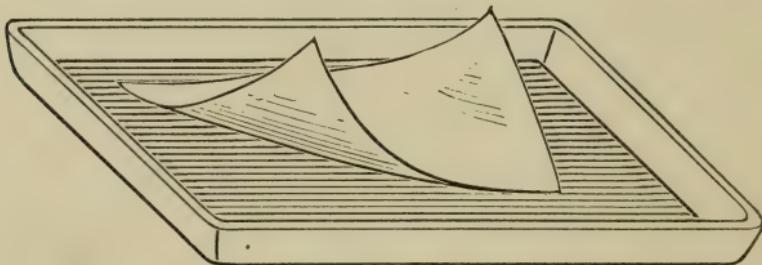


Fig. 9.

Let the paper remain on the bath for 35 or 40 seconds, then raise it, and holding it by the corner you turned down, let the superfluous solution drain off into the dish, and hang it up to dry in a dark room. This will keep for two or three days before it will get too yellow to

use. It is, perhaps, the best plan to sensitize in the evening what you intend printing the next day, and no more. When the paper is quite dry it is ready for

4.—THE FUMING.

This is done by hanging the paper in a box in which a little aqua ammonia is exposed in a saucer. Different kinds of boxes have been made in order to get the paper fumed evenly. Mr. Hearn describes his box thus: "Take any common wooden box large enough for the purpose, and make a door of suitable size for it, which, when shut, will totally exclude all light. Make a false bottom in this about six inches from the real one, and perforate it with holes of about the size a large gimlet would make. These holes should be very numerous, and at the centre of the board there should be, if anything, a smaller number of them, because the saucer containing the liquor ammonia is generally placed at the centre of the real bottom of the box." The sheets of paper can be pinned to the sides of the box, or they can be hung by means of spring clips from strips of wood fastened at the top of the box, and in order to keep the paper from curling up when drying, a piece of lath with a clip nailed to each end can be attached to the bottom of the sheet. About half an ounce of aqua ammonia is sufficient; put it in a saucer, place it on the bottom of

the box, and shut the door. The time of fuming varies from ten minutes to half an hour. Short time in summer, and longer time in winter ; less time on a dark day than on a bright day.

5.—PRINTING.

For this purpose you require one or more boards made in a particular way, or else frames such as are used by the photographers. Fig. 10 will show you at once

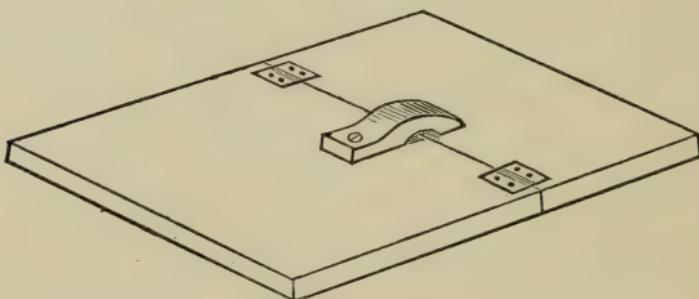


Fig. 10.—BACK VIEW.

the construction of the board (back view). It is very simple, being only a piece of hard wood nicely cut in two, either through the middle or so as to have one piece one-third larger than the other. These pieces are hinged together, and a small block screwed to one so as to turn over upon the other and hold it. Fig. 11 gives you a view of the *front* with the two brass springs holding the plate in contact with the paper. This front is covered with canton flannel, a piece of which is glued to

each half board, making a soft cushion for the paper. The frame in common use is presented in Fig. 12. Sometimes the board is made thin at the corners, and

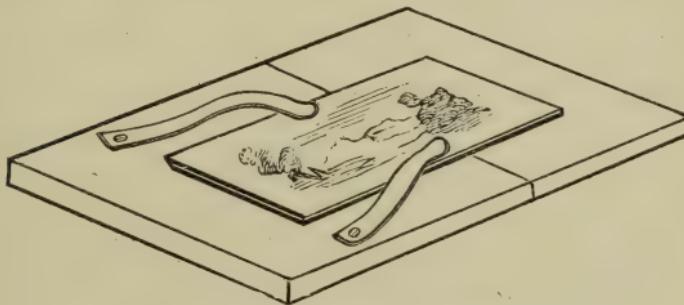


Fig. 11.—FRONT VIEW.

spring clips are used to hold the plate. With the board you first lay on the paper, silvered side up, and on it place the plate with the etched side next the paper. In using the frame, the plate is put in first and the paper

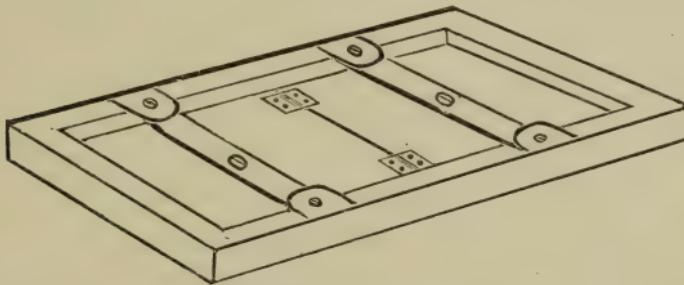


Fig. 12.—BACK VIEW.

laid on it, the back put in and fastened down. This being done, you place the board or frame so that the light will fall directly upon it, without any shadows being

cast from any object upon the plate. In a very short time, if the light is strong, the picture will be printed. It is then removed from the frame, when it has a strong purplish-black hue, and is put in a box or drawer where no light can reach it. After you have printed as many copies as you desire, you next proceed to

6.—THE TONING.

In the evening, when the light is feeble, and away from the window, take a bucket half full of lukewarm water, and plunge the prints into it one by one, taking care that they do not stick to each other, and that each one is entirely submerged. Next put 10 to 15 drops of acetic acid (No. 8) in a gallon of water in another bucket or earthenware dish; put the prints rapidly into this and keep them in motion for three minutes; then they are ready for the toning bath.

To make this bath, have on hand *Solution 1*, made by dissolving a quarter of a drachm of chloride of gold in fifteen ounces of water. Keep this in a dark place.

Solution 2.—A quarter of a pound of acetate of soda in forty-eight ounces of water. Now take water, 30 oz.; solution 1, 3 oz.; solution 2, 3 oz. Mix and let stand in the dark for a week before using; or, if wanted sooner, make it with hot water.

When the prints are washed, pour into a porcelain

dish a sufficient quantity to make it one-third full. Then put in the prints, one at a time, and immerse them *at once*, so that all parts of the picture will be toning at the same time. Do not have more than three or four prints in the bath at once. Remove them as soon as they arrive at a purplish-brown or black color (the action of the water and acid having made them red), and keep them away from any strong light. When all are toned pour the bath into a jug or bottle, and keep for the next time. The prints have again to be washed and then fixed.

7.—THE FIXING.

In order to remove every trace of silver, and keep the prints from fading out, a fixing agent is necessary. This solution is made as follows: Take a one gallon bottle and place in it half a pound of the crystals of hyposulphite of soda, and fill up with water; shake well, and let stand for two days. When about to fix the prints, take hypo. solution, 1 oz.; water, 8 oz.; saturated sol. of bicarb. of soda, $\frac{1}{4}$ oz.; in a dish kept for this and nothing else. Now plunge the prints into this rapidly, and keep them in motion, not allowing them to stick together for a moment. After they have been in this bath for eight or ten minutes, hold one up between yourself and the light; if the clear spaces, such as the sky, look spotty,

the fixing is not done, and you must keep moving the prints and looking through them until the spaces not printed upon look clear and bright. A little practice will soon enable you to judge at once. When sufficiently fixed, remove them into clean water, and wash three or four times, until every trace of soda is gone. Dry and mount on paper or cardboard, and all is finished.

PART V.

MAKING A PICTURE WITHOUT BEING ABLE TO DRAW.

There are many young persons who have not had the advantage of instructions in drawing, who yet have a taste for artistic pursuits, and would enjoy making pictures if only they could find some way to assist their uncultured eyes and hands. For the benefit of such we add this chapter to our manual, in the hope that some will be encouraged to try, and with the assurance that if the advice given in this little book is followed, they will meet with considerable success.

Various means have been devised to overcome difficulties in the way of the youthful artist. The best assistant, we think, is a camera obscura, or sketching camera, as it is called. With such an instrument, used

as we propose, almost any person might succeed in reaping very much of the pleasure to be derived from collodio-etching without knowing the principles of drawing.

Like nearly everything else, the camera obscura may be a very plain, simple, inexpensive affair, or a very handsome and costly instrument. A boy, scarcely twelve years old, made one out of a thick pasteboard box and a common magnifying glass set in a pasteboard tube, which answered the purpose very well. We constructed one, some years ago, out of a starch box. This box was six by nine inches, and six inches deep. Making a round hole in one end, a common single landscape lens, with tube, from a small photographic camera, was inserted. The lid was taken out, and a piece of looking-glass, cut to fit, was placed inside, slanting downwards from back to front, so that the rays from the lens are reflected upwards. Now, in order, to see the picture, we fitted a piece of ground glass in place of the lid. A light frame was next made and hinged to the top of the front, so as to fall backwards and cover the ground glass, and to this was tacked a large piece of black velvet, which was thrown over the head to exclude the light. This frame is supported on the left side by a stick screwed to the side of the box. A square box is better than an oblong one. All this can be easily understood

by looking at the accompanying sketch, Fig. 13. The dotted lines represent the mirror inside the box.

Suppose you have such instrument, all you need to do is to put a prepared plate, thinly varnished, on the top

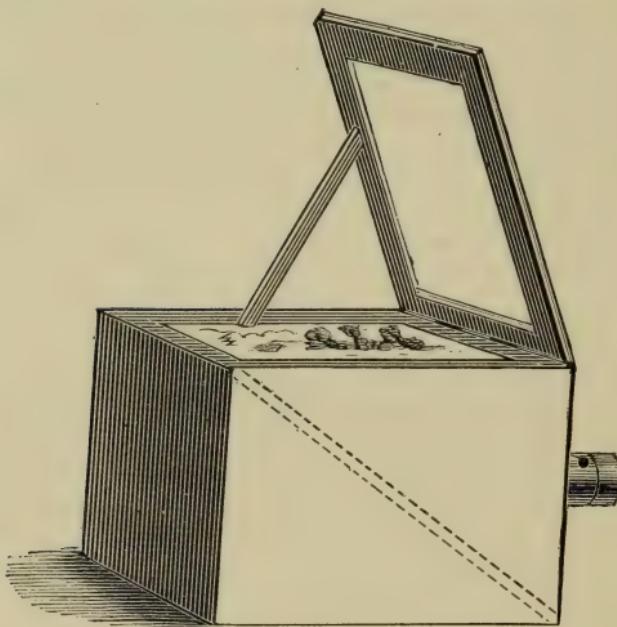


Fig. 13.—SKETCHING CAMERA.

of the ground glass—varnished side up, of course—and trace the picture with a needle. If you wish to substitute the prepared plate for the ground glass, so as to get the image sharper and closer to your point, you must employ a varnish called "Ground Glass Substitute," used by photographers. To this you must add about one-third more alcohol.

The picture thus made is reversed and ready for printing, and besides is a drawing *direct* from nature.

One thing more to be considered, and that is how to support the camera while working. For this purpose you will find a tripod the most convenient article. The camera must, in some way, be fastened to the top, so as to remain perfectly still. Photographers use a bolt with screw and nut, but there are other ways of accomplishing the same object.

Messrs. Queen & Co. make and sell a little camera obscura with a tent, which is highly recommended for use by those unacquainted with drawing. By this instrument the picture is thrown down on a table inside the tent, and is sketched very easily, the principal trouble being the shadows cast by hand and pencil. It is not adapted to our purpose, however, as we must have the light reflected from below the plate.

With the camera above illustrated and described, and a number of prepared plates, any one, with a little practice, can fill a day or a week at home or abroad with profitable pleasure.

There are only two drawbacks to this practice: the first is the lack of artistic freedom. All you can do is to copy what is thrown on your plate; this can be overcome by an artist, but should not be attempted by anyone else. The second disadvantage is in being unable

in many instances to find a good standing place for the tripod, so as to get just the view you wish; but the great advantage of being able to etch your plate on the spot, where a suitable place can be obtained, knowing that it is absolutely true to nature, will in most minds more than compensate for the disadvantages spoken of.

Let me, in closing, recommend the making of simple outlines first. A well-drawn outline is far better than a poorly-shaded picture, and can express a great deal more than is often imagined. After some practice in shading with a pencil, you can easily add it on your plates.

APPENDIX.

Some things that may happen, and what to do about them.

In spite of all precautions, and notwithstanding the fact that the directions are implicitly followed, little things will sometimes occur that will annoy and perplex the student considerably if not forewarned. In order, therefore, to forewarn and so forearm the etcher, we will mention here the six chief troubles.

1. The first thing that may happen to a plate is the peeling off of the collodion film. This occurs when the plate is being washed after strengthening, and the *cause*, which at once suggests the remedy, is that the plate was not thoroughly cleaned. A very good practice, and one adopted by photographers generally, is to albuminize the plates after cleaning. This is done by coating the plates with albumen, made as follows: White of one egg, well beaten; 35 oz. of pure water.

2. The next thing likely to happen is that the corner on which the iron solution is poured for strengthening is much more transparent than the rest of the plate. This is caused by the action of the iron not being sufficiently restrained, and all you have to do is to add a few drops of acetic acid and alcohol to your solution.

3. Another trouble will be found in attempting to draw very delicate lines. No matter how small the needle is, it is frequently found to take off more of the film than is desired. In order to

obviate this difficulty, you must keep the needle *very* sharp, either by filing it or rubbing it on a piece of sandstone. Coat the plate with *very* thin varnish, bend the point of the needle, and then draw it over the surface, and the finest lines will be the result.

4. In "stopping out" you must be very careful not to allow the varnish to run over lines which you wish to remain clear, for, as this varnish is just the opposite of the other—that is, having very little alcohol and a good deal of gum and color—you will find it quite difficult to scratch it off again when once set. It will break under the needle, and, bringing the film with it, will leave transparent spots instead of lines.

5. Sometimes an air bubble will escape notice in sensitizing the paper, and so when printing you will find a white spot instead of some detail of the drawing. Don't take it out and throw it away, but finish it up just like the rest, and when mounted take a little India ink and sepia and touch in the details, and so save the picture.

6. Be sure not to fold the paper except where it is going to be cut, otherwise, when it is wet in washing, it will be very apt to tear at the crease and spoil the print. Plain paper is thinner than the albuminized.

THE ETCHINGS.

We add to the plates of this little volume four etchings, not as showing the perfection of the art, but merely as hints which we hope will, by their very faultiness, encourage the student to attempt and achieve far greater things. They are simple essays, done in the odd moments of a busy life, and as such the reader must view them, believing that the system illustrated by them is capable of being carried *very* much further than the exhibit.

ETCHING I.

This plate, which is a sketch from nature, was accomplished at one sitting of about two hours. This will show how rapidly these negatives can be made. There being but little in this view, it is a good subject to begin with. Only the finest and medium needles were used. Notice the lightness of the outline on the top of the hill, which is produced by one coat of the stopping-out varnish. Also observe that the picture is made by the boldness of contrast rather than by carefully-worked details.

ETCHING II.

In this view on the Marmaton River, Kansas, there being no large trunks or rocks, the largest point was little used, and nearly the entire work was done with the finest needle. In looking at the plate with the naked eye, there does not seem to be any film left on the trees, the little curved lines are so close together; the printing, however, reveals many points of light. The dash

of sunlight which runs across the middle distance is made in part by putting a broad line of varnish over the reflections. The distant foliage being in the strongest sunshine, very few and very fine lines are used.

ETCHING III.

Here we have a subject capable of being treated with all the boldness of a charcoal drawing, and at the same time requiring very careful handling in order to produce the effect of distance. The hillside being in shade, it is covered over with a *tint* made by fine lines regularly drawn. There is another and a very excellent way of obtaining a half tone for such studies; it is by using the collodion film without being strengthened. After the plate is taken out of the silver bath it is simply washed, by pouring clean water over it, and then dried. This leaves the film quite transparent. The difficulty with such a plate is in painting on the high lights. These are very apt to be spotty and unsatisfactory; for some simple effects, however, it does very well. A plate like the one before us can be worked backwards; that is, beginning with the principal trunk and foreground, using the largest needle, and making the lines finer as the trees recede.

FRONTISPICE.

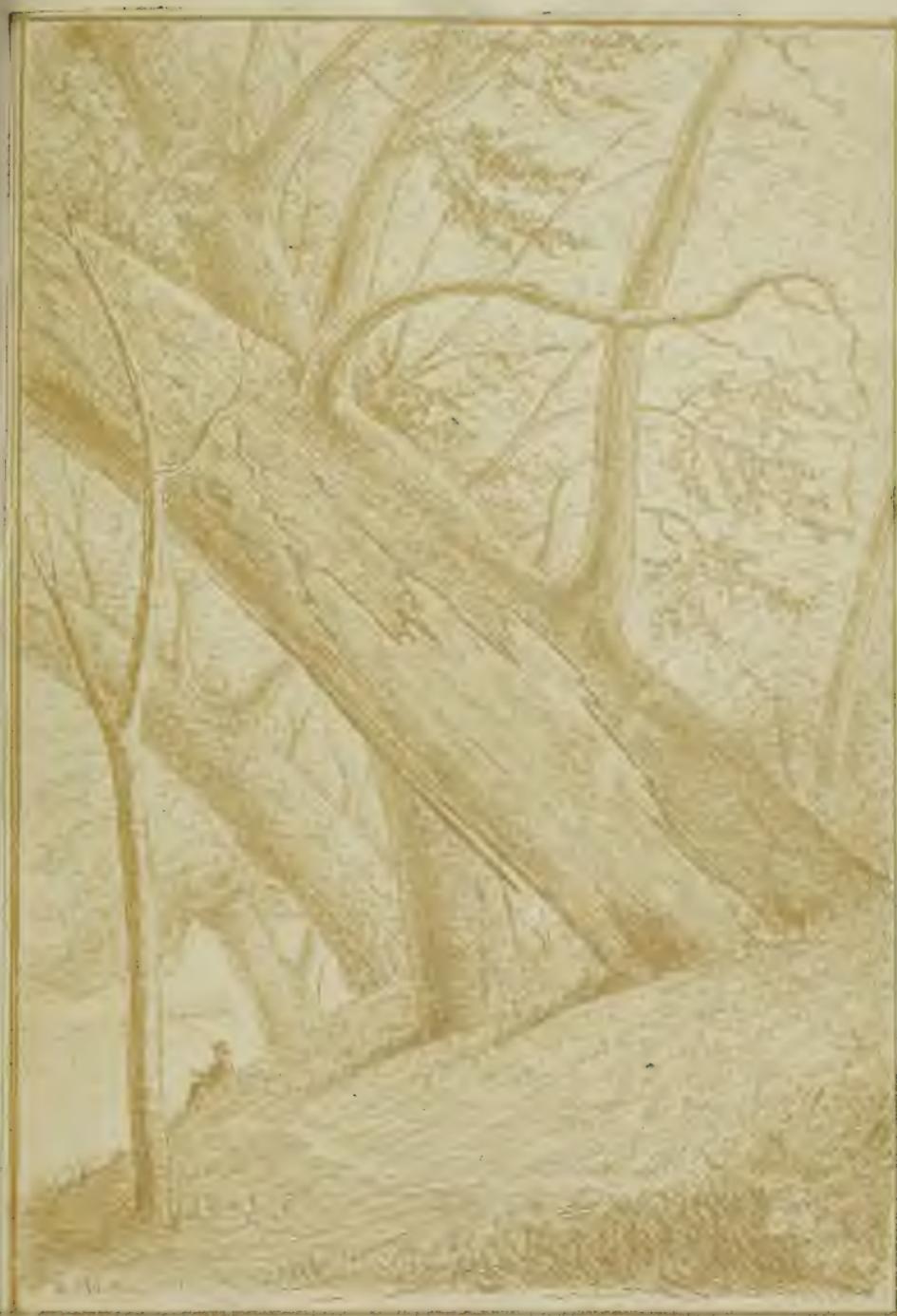
The sketch on the Delaware River, Pennsylvania, used as a frontispiece, gives the effect of cross-line shading in both sky and water. The picture represents early morning, when the reflections, though strong, are dimmed by the rising mists. The sky, which in Plate I is in outline, is here worked up so that the streaks of light seen in the landscape are duplicated in the clouds. The smoke from the chimney, and the faint ripple on the water, are made with the same stopping-out varnish.



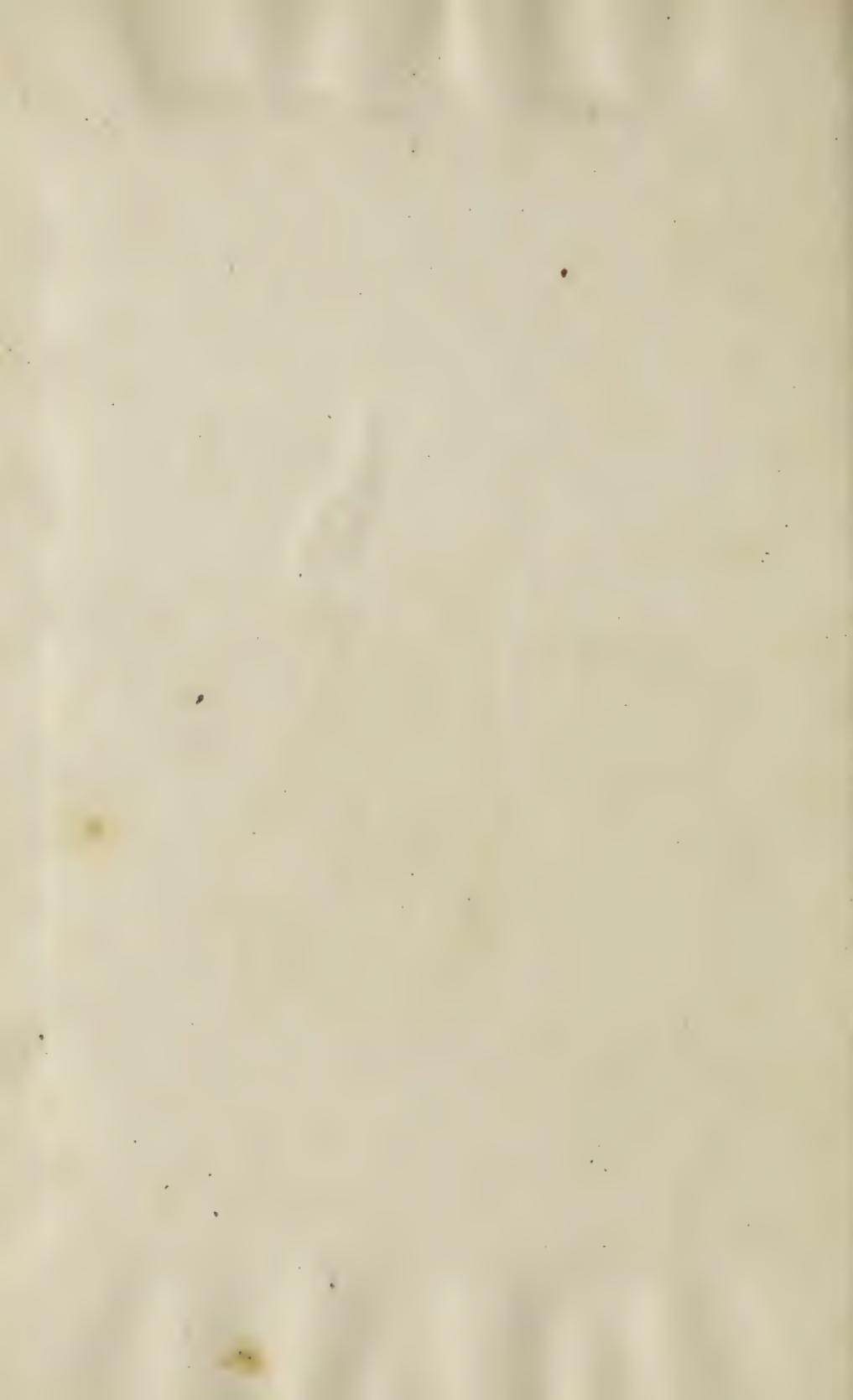
AT FLAT ROCKS, KANSAS.

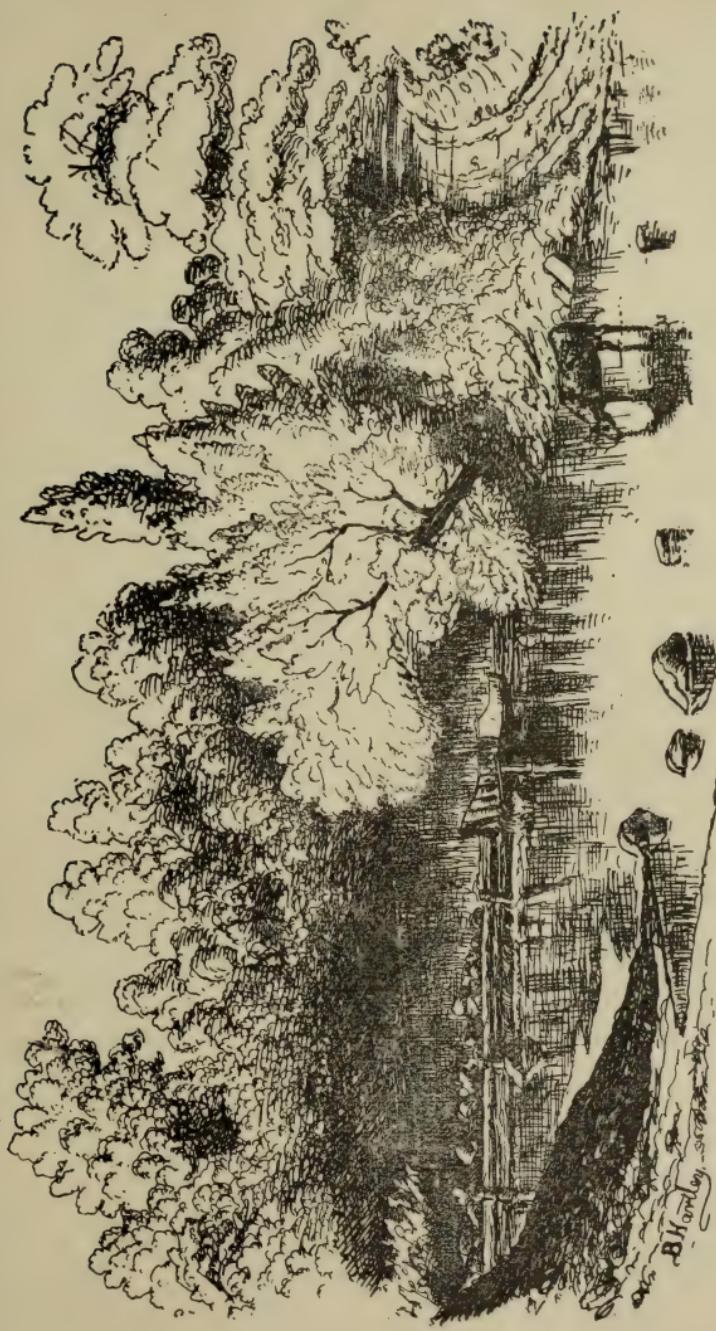


ON THE MARMATON RIVER, KANSAS.

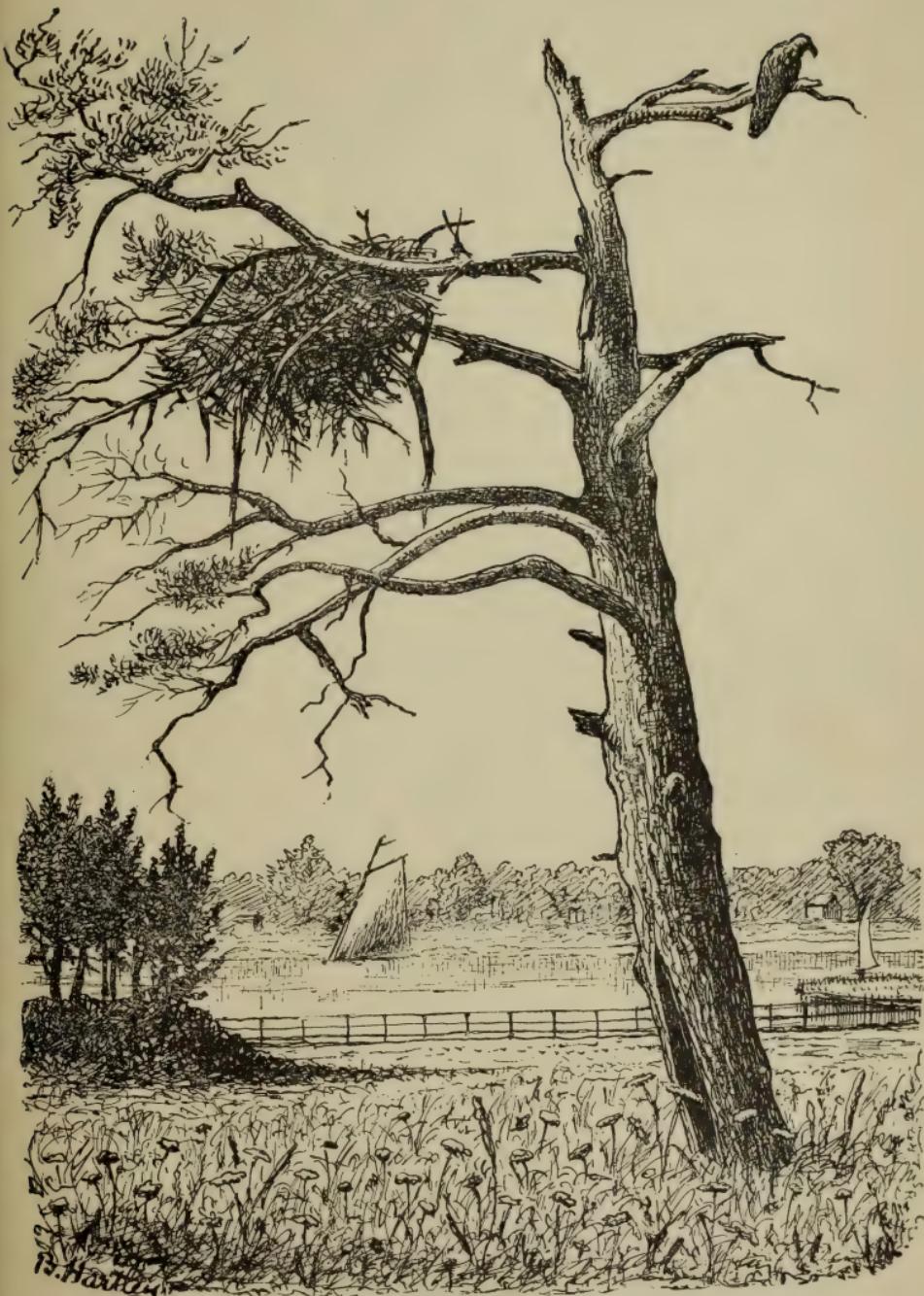


STUDY OF TREES.





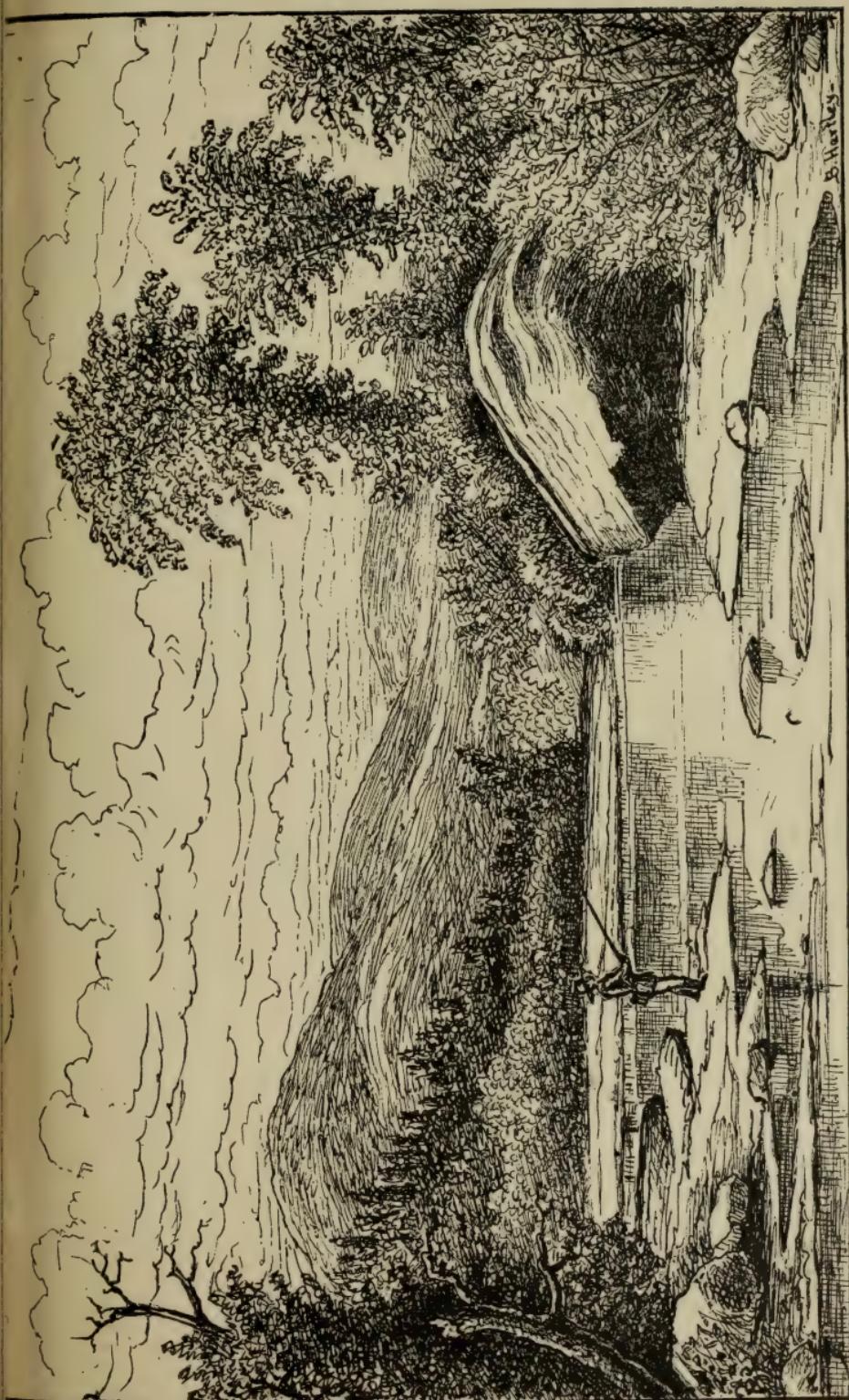
VIEW ON MARMATON RIVER.



FISH HAWK'S NEST, Manasquan River, N. J.

"Scene in the Catskills."

ILLUSTRATION OF COLLODIO-ETCHING.



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